WHAT IS CLAIMED IS:

1. A power converter comprising:

a switching transistor;

a pulse frequency modulator configured to control the switching transistor, wherein the pulse frequency modulator is enabled during a burst period in which an output of the power converter is less than a predetermined level;

a peak current detector configured to sense current through the switching transistor and to output a peak current pulse to the pulse frequency modulator to turn off the switching transistor when the sensed current exceeds a peak reference level; and

a load sensor configured to monitor the output of the peak current detector to change operating modes for the power converter, wherein the power converter changes from a hysteretic mode to a continuous switching mode when the number of peak current pulses in the burst period exceeds a predetermined number..

2. The power converter of Claim 1 further comprising:

a feedback comparator configured to monitor the output of the power converter; and

a filter circuit coupled to an output of the feedback comparator and configured to generate a variable voltage, wherein the variable voltage is used by the peak current detector as the peak reference level when the power converter is operating in the continuous switching mode and the power converter changes from the continuous switching mode to the hysteretic mode when the variable voltage falls below a predefined threshold.

3. The power converter of Claim 1, wherein the peak reference level is substantially constant during the hysteretic mode.

4. The power converter of Claim 1, wherein the load sensor is a counter that increments with each peak current pulse and resets at the end of each burst period.

5. The power converter of Claim 2, wherein the filter circuit is an integrator and the variable voltage is proportional to the duty cycle of the output of the feedback comparator.

6. A method to convert operating modes in a switching regulator, the method comprising the steps of:

turning on a pulse frequency modulator for a burst period when an output of the switching regulator is less than a first level, wherein one or more switching cycles for a switch occur in the burst period;

turning on the switch in each switching cycle until the switch conducts a peak current followed by a switch off-time of a predetermined duration; and

converting from a hysteretic mode to a continuous mode when the number of switching cycles in a burst period exceeds a predetermined value.

7. The method of Claim 6 further comprising the steps of:

generating a variable threshold to control the peak current conducted by the switch during the continuous mode; and

converting from the continuous mode to the hysteretic mode when the variable threshold is less than a predefined level.

8. The method of Claim 6, wherein the peak current is substantially constant during the hysteretic mode.

9. The method of Claim 7, wherein the variable threshold is generated from a feedback voltage indicative of the output of the switching regulator.

10. The method of Claim 6, wherein the switching regulator is a boost converter.

11. A switching regulator using a dual-mode pulse frequency modulation technique comprising:

means for sensing a transition from relatively light load current to relatively heavy load current by monitoring switching cycles of a switch; and

means for operating the switching regulator in a hysteretic mode during relatively light load current, wherein the switch conducts a substantially fixed peak current during the hysteretic mode; and

means for operating the switching regulator in a continuous switching mode during relatively heavy load current, wherein the switch conducts a variable peak current during the continuous switching mode. .

12. The switching regulator of Claim 11, further comprising:

means for sensing an output of the switching regulator;

means for generating a feedback voltage by comparing the sensed output to a reference voltage; and

means for controlling the variable peak current based on the feedback voltage.